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मानक

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IS 13429-2 (2000): Solar Cooker - Box Type, Part 2:
Components [MED 4: Non-Conventional Energy Sources]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

सौर कुकर — बॉक्स टाइप — विशिष्टि

भाग 2 घटक

(पहला पुनरीक्षण)

Indian Standard

SOLAR COOKER — BOX TYPE — SPECIFICATION

PART 2 COMPONENTS

(*First Revision*)

ICS 27.160, 97.040.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Part 2) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Non-Conventional Energy Sources Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1992 as one of the three parts of Indian Standards on solar cooker, the other two parts being on Requirements and Test Methods. Two amendments were issued, one in January and other in July 1993.

This standard has been revised based on the feedback received from various organizations connected with the solar cooking programme in the country. The present revision has been drafted with a view not to restrict the size, material, shape and design and simultaneously specifying the requisite performance parameters.

The other parts of solar cooker standards simultaneously revised are as follows:

- | | |
|-------------------|--|
| IS 13429 (Part 1) | Solar cooker — Box type — Specification: Part 1 Requirements (<i>first revision</i>) |
| IS 13429 (Part 3) | Solar cooker — Box type — Specification: Part 3 Test methods (<i>first revision</i>) |

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard. Where specific limit ('Maximum' or 'Minimum') has been stipulated in the standard the values obtained shall be rounded off in one direction only in accordance with Amendment No. 1 February 1997 to IS 2 : 1960 (*revised*).

Indian Standard

SOLAR COOKER — BOX TYPE — SPECIFICATION

PART 2 COMPONENTS

(*First Revision*)

1 SCOPE

This Indian Standard (Part 2) specifies the requirements of various components of box type solar cooker.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 DEFINITIONS

For the purpose of this standard, the terminology and definitions given in IS 12934 shall be applicable.

4 COMPONENTS

4.1 Cover Plate

The cover plate shall be double glazed. Spacing between inner and outer glazings shall be 10 ± 2 mm. The solar transmittance of cover plate consisting inner and outer glazings together shall be minimum 65 percent at near normal incidence. The glazings shall be free from bubbles and rough surface and shall conform to the requirements given in 5.1. Provision on the side shall be made to keep the cover plate at inclined position for loading and unloading of the cooking pots.

4.2 Cooking Tray

4.2.1 The tray shall be of aluminium/copper having minimum thickness as 0.5 mm.

4.2.2 Inner surface of the cooking tray shall have mat black finish. It shall withstand temperature of 175°C for one hour without deterioration of the finished surface. Later, the same surface be allowed to cool to room temperature and dipped in boiling water for 10 minutes and then shall conform to the requirement specified in 4.2.2.1 at room temperature.

4.2.2.1 Select 10 mm × 10 mm area of painted surface. Form squares of 1 mm × 1 mm by scratching horizontal

and vertical lines by a pointed tool. Cover the test surface portion with adhesive cellulose tape (*see* IS 13262) properly, then remove the tape with jerk. Inspect the test surface, there shall be no peeling of paint.

4.3 Cooker Box

4.3.1 Typical materials for solar cooker box and top cover are given below for guidance. However in case of their use minimum thickness requirements shall be complied with.

<i>Material</i>	<i>Minimum Thickness, mm</i>	<i>Relevant IS No.</i>
Galvanized steel (GS) sheet	0.45	277
Aluminium (Al)	0.50	737
Fiber reinforce plastic (FRP)	1.00	10192

4.3.2 The cooker box shall be smooth, even and free from sharp edges.

4.4 Gaskets and Sealants

The material may be of neoprene/ethylene propylene diene monomer (EPDM)/silicon rubber of minimum 2 mm thickness to seal the closed lid and tray and shall conform to requirements given in 5.2.

4.5 Insulation

Insulation shall be provided at sides and bottom including edges. Thermal resistance (R) of insulation material shall be minimum $0.96 \text{ m}^2 \text{ }^\circ\text{C/W}$. This shall be derived after determining thermal conductivity (K) value at 100°C mean temperature in accordance with IS 3346.

4.5.1 The thermal resistance value (R) of insulation for non-metallic body cookers shall be $0.58 \text{ m}^2 \text{ }^\circ\text{C/W}$ minimum provided the cooker meets the requirements of thermal performance test specified at 7.2.2 of IS 13429 (Part 1).

NOTE — Thermal resistance (R) value shall be derived by the equation $R = L/K$ where L = thickness of insulation material and K is thermal conductivity. Thermal conductivity shall be determined at 100°C mean temperature in accordance with IS 3346.

4.6 Mirror

Mirrors shall be free from bubbles and waviness having minimum 65 percent solar reflectance. The reflecting area of mirrors shall not be less than the glazing area. Provision on the sides shall be made to keep the mirror in any inclined position.

4.7 Cooking Pots with Lid

4.7.1 The solar cooker shall be supplied with the aluminum alloy (*see* IS 21)/ stainless steel [*see* IS 4536 (Part 1)/IS 4536 (Part 2)/IS 5522] pots with suitable lids.

4.7.2 Solar cooker cooking pots shall be coated with mat black surface on outside which shall conform to the requirements as specified in 4.2.2. The bottom of the pots shall not be coated.

4.8 Caster Wheels

Solar cooker may be provided with 4 caster wheels each having ball bearing (*see* IS 5932) or two cylindrical plastic or non-corrosive supports (buffers) for front and two plastic or non-corrosive wheels for rear.

4.9 Workmanship and Finish

All the surfaces shall be smooth and free from roughness, raised spots, scale or any other surface defects. Sharp edges and corners shall be rounded off.

The screws, hinges, lever rods, locks, handle, caster wheels etc, used in the cooker shall be properly fitted. The weight of various components of cooker shall also be set in such a way that it does not topple back while lifting the cover plate for loading and unloading of cooking pots.

5 TESTS

5.1 Transmittance Test for Cover Plate

Measure the solar radiation with pyranometer directly (without glazings) and then having cover plate above the pyranometer. The ratio of the two readings shall be minimum 0.65.

NOTE — For routine test photo-voltaic based solarimeter may be used.

5.2 Thermal Shock Test for Gasket and Sealants

Keep the gasket and sealant of 10 cm in length in an electric oven at a temperature of 150°C for 4 hours and then cool in air for 2 hours. Put it again in the oven at 150°C for 4 hours and then cool in air for 2 hours. After the test, the gasket and sealant shall show no crack/brittleness.

6 MARKING

6.1 Each component may be marked or a label affixed with the manufacturer's name, initials or recognized trade-mark.

6.2 BIS Standard Mark

6.2.1 The solar cooker components may also be marked with the Standard Mark.

6.2.2 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
21 : 1992	Wrought aluminium and aluminium alloys for manufacture of utensils (<i>fourth revision</i>)	(Part 1) : 1987	Copper electrodeposited (<i>first revision</i>)
277 : 1992	Galvanized steel sheet (plain and corrugated) (<i>fifth revision</i>)	(Part 2) : 1969	3 Ply construction
737 : 1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (<i>third revision</i>)	5522 : 1992	Stainless steel sheet and strips for utensils (<i>second revision</i>)
3346 : 1980	Method of the determination of thermal conductivity of thermal insulation materials (two slab guarded hot plate method) (<i>first revision</i>)	5932 : 1970	Boundary dimensions for thrust ball bearings with flat seats
4536	Composite bottom stainless steel cooking utensils:	10192 : 1982	Synthetic resin bonded glass fibre (SRBGF) sheets for electrical purposes
		12934 : 1990	Solar energy — Thermal applications — Vocabulary
		13262 : 1992	Pressure sensitive adhesive tapes with plastic base
		13429 (Part 1) : 2000	Solar cooker — Box type — Specification: Part 1 Requirements

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 323 76 17 323 38 41
Eastern : 1/14 C. I.T. Scheme VII M, V. I. P. Road, Kankurgachi CALCUTTA 700 054	{ 337 84 99, 337 85 61 337 86 26, 337 91 20
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 60 38 43 60 20 25
Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600 113	{ 235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	{ 832 92 95, 832 78 58 832 78 91, 832 78 92

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